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Rachel Ong, Gavin A. Wood and Melek Cigdem

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Rachel Ong[1], Gavin A. Wood[2] and Melek Cigdem[2]
[1] School of Economics and Finance, Curtin University, Australia
[2] School of Global, Urban and Social Studies, RMIT University, Australia

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WORK INCENTIVES AND DECISIONS TO REMAIN IN PAID WORK IN AUSTRALIA[1]

Rachel Ong
School of Economics and Finance, Curtin University

Gavin A. Wood
School of Global, Urban and Social Studies, RMIT University

Melek Cigdem
School of Global, Urban and Social Studies, RMIT University

1. Introduction

Lifting workforce participation rates is a key objective of Australian policy-makers. The most recent evidence of this emerged in the lead up to the 2013 Federal election. The Coalition proposed that young Australians unemployed for 12 months or more and receiving Newstart Allowance will be offered a job commitment bonus of $6,500 if they are able to commence and maintain continual employment for 24 months. This measure is designed to reduce the work disincentive effects that discourage the take-up of employment, though the work incentive position of those working is unaffected. Work incentives and welfare dependency have been a long-running concern in public policy circles; for example, back in 2000, the McClure Report (Reference Group on Welfare Reform, 2000) cited inadequate financial rewards for some forms of work as a major shortcoming of Australia's welfare system.

There are at least three reasons why work incentives are a continuing policy concern. Firstly, the ageing of the Australian population and an increasing dependency ratio is a major cause of fiscal pressures for a Commonwealth government grappling with a budget deficit that is forecast to reach $30 Billion in 2013-'14. By lifting rates of economic participation, and in particular extending working lives, governments hope to ease these fiscal pressures. Secondly, there is recurring unease that blunt work incentives result in welfare dependency. The observation that 18% of Australia's working age population (over 2.4 million people) is at least partly dependent on income support payments is a reason for apprehension[2]. Thirdly, the geography of Australian labour supply is one where regions with persistently high rates of unemployment continue to exist alongside regions with labour shortages. Areas of metropolitan and regional Western Australia exhibit the most serious shortages of labour as a result of the mining boom. Regional labour market adjustments should produce a wage surge in these areas, and hence sharpen work incentives and encourage labour supply. But high housing costs are believed to eat into wage incentives and impede these regional adjustments.

In an earlier study (Dockery et al. 2011) we analysed the work incentives of the unwaged over the short period 2001-2003. The current paper shifts the focus by considering the work

[1] This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the author and should not be attributed to either DSS or the Melbourne Institute. The authors gratefully acknowledge the financial support provided for this research by the Bankwest Curtin Economics Centre.

[2] Population weighted estimates based on a sample of independent individuals aged 15-64 years from the 2011 Household, Income and Labour Dynamics in Australia Survey.

incentives of the employed and the financial motives underpinning decisions to remain in paid work. This is of particular relevance to policies aimed at extending the working lives of mature age workers. To measure work incentives, we use a microsimulation model covering a comprehensive range of Australian taxes and benefits; it allows us to analyse interactions between taxes and benefits over almost a decade (2001-2009). The model is operationalised using a nationally representative longitudinal survey – the Household, Income and Labour Dynamics in Australia (HILDA) Survey.

Following a brief review of the literature, the paper profiles changes in work incentive measures over the first decade of the new millennium in order to detect whether the incentive to work has become stronger or weaker. It also explores variation in work incentives across subgroups in the population with a view to identifying those lacking a strong financial motive to remain in employment. The geography of work incentives is examined by comparisons drawn across state capitals and non-metropolitan regions. We then analyse whether the labour market behaviour of employed Australians is actually affected by work disincentives. Measures of work incentives are added to models that predict the probability of remaining in paid work. A conclusion summarises and offers some observations on the significance of our findings.

2. Background literature

A number of studies present work incentives estimates for Australia.[3] The typical measures in these studies are effective marginal tax rates (EMTRs) and replacement rates (RRs). The EMTR measures incentive effects at the margin - the financial reward when earning an extra dollar. In reality, most workers cannot choose an exact number of hours worked, and instead face more limited options such as choosing between working and not working, or between working part-time and full-time. The RR, which is the ratio of income when out of work to income in work, is the more relevant measure for choices between working and not working.

An extensive body of empirical literature exists that examine the impact of tax-benefit policies on work disincentives and labour supply in Australia. The more recent empirical literature examining the impact of tax-benefit policies on work disincentives and labour supply include Buddelmeyer et al.'s (2006) evaluation of policy options to encourage welfare to work transitions, Cai et al.'s (2008) evaluation of the year 2000 *Australian New Tax System* changes on lone parents' labour supply, Creedy et al.'s (2009) study on the labour supply impacts of abolishing the tax-free thresholds in Australia, Kalb and Thoresen's (2010) comparison of family policy designs in Australia and Norway, and Wood et al's (2010) estimation of the work disincentives of public housing tenants. These Australian studies have largely relied on behavioural microsimulation approaches, operationalized on repeated cross-sectional Surveys of Income and Housing (SIH) from the Australian Bureau of Statistics (ABS).

Other studies have extended this literature by applying microsimulation modelling within a dynamic context to examine work disincentives and transitions into employment using panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey (see Dockery et al. 2008; Dockery et al. 2011). While panel data modelling has been used overseas to model the impacts of tax-transfer settings on employment transitions, in particular

[3] See Beer (1998); Beer (2003); Beer and Harding (1999); Bradbury (1992); Bradbury (1993); Bradbury, Ross and Doyle (1991); Daly (1992); Dockery et al. (2008); Flatau and Wood (2000); Harding and Polette (1995); Harding et al. (2009); Polette (1995); Whitlock (1994); Wood et al. (2005).

within a hazard rate framework (see, for example, Nickell 1979; Card and Levine 2000; Whelan 2009), Dockery et al. (2008; 2011) is among the first Australian papers to empirically isolate the disincentive effects of tax-transfer settings on labour supply decisions.

Panel studies have typically focused on transitions *into* work, as they were often motivated by welfare to work policies that are premised on the proposition that existing welfare programs deter employment participation because they weaken the financial motives to work. Less attention has been paid to the influence of tax-transfer policies on incentives to *remain in* paid work, though studies such as Merrilees (1982; 1983) have argued that the widespread availability and attractiveness of government transfers is a key driver behind older males' decisions to exit the labour force. Austen and Ong (2010; 2013) argue that policies designed to prolong employment retention could boost the labour force participation rates of older females. Indeed, a recent study by Warren (2013) has gone even further by suggesting that policies encouraging older workers to extend their working lives are more effective in lifting mature age participation than policies motivating unwaged older workers to re-enter the workforce.

The existing literature has understandably concentrated on the interactions between taxation and benefits. But the wealth holdings of Australian workers could be an increasingly important influence on decisions to remain employed. The primary home dominates the asset portfolios of Australians, regardless of gender or household type (Jefferson and Ong, 2010). This is because real house prices have soared, leaving the baby boomer generation in particular with a windfall gain that earlier generations did not benefit from as retirement approached. However, there is evidence that some baby boomers have tapped into this housing wealth by adding to mortgages (Ong et al. 2013). Therefore the role of housing assets and debt secured against these assets in shaping labour supply choices is a complex one. Furthermore, with the introduction of the compulsory superannuation guarantee in the early 1990s, an increasing number of workers are approaching retirement with large amounts of pension wealth to fall back on. This study offers some insights into the role of housing, debt and superannuation wealth in shaping employment decisions.

3. Methodology

Data and sample

As the name implies, the HILDA Survey comprehensively covers the three inter-related areas of income, labour and household dynamics. The survey also offers a range of variables describing the key socio-economic and demographic characteristics of survey participants. A sample of adults observed to be employed full- or part-time on one or more occasions is drawn from waves 1 to 10 of the HILDA Survey, covering the period 2001-2010. We include individuals that are employed during time t ($2001 \leq t \leq 2009$) and model employment participation in $t+1$ ($2002 \leq t+1 \leq 2010$). Individuals are included in a person-period data set whenever they are observed in employment at time t. Thus the same individual may contribute multiple observations and more than one transition in this pooled dataset. We model transitions out of paid work, whether from paid employment to unemployment or economic inactivity.

Following Dockery et al. (2011), we exclude persons aged under 25 years. There are two reasons; firstly to abstract from movements into and out of education and training that characterise the labour market for young people. The nature of non-labour force participation

among many in this cohort is quite distinct from non-participation among older cohorts because the labour supply decisions of youths are motivated by different factors. Secondly, labour market history is known to be a powerful predictor of labour market outcomes and captures important unmeasured individual effects, hence reducing scope for omitted variable bias. For young people with a very limited history the value of such labour market history variables is questionable. Other labour market studies that have either omitted persons aged under 25 or estimated models separately for persons aged under 25, and those aged 25 and over, include Breunig and Mercante (2010), Schuetze (2000) and Zavodny (2000). It is common to exclude those aged 65 years and over because most papers deal with transitions into work, and the over 65s are presumed retired. However, we include those aged 65 years and over if they have been employed in one or more waves. The inclusion will facilitate analysis of how housing and superannuation wealth might impact on the retirement decisions of older cohorts.

This sample design creates a dataset containing 7,968 individuals. These individuals are employed in 33,933 person-periods. There are 2,229 transitions out of employment. 493 of these transitions are into unemployment and 1,736 are out of the labour force. The numbers employed in any one wave are stable, ranging between 3,606 and 3,964.

Measurement of work incentives

In the Australian (and international) literature, the EMTR is generally proposed as one of the most important drivers of workforce participation and work hours decisions (see Buddelmeyer et al. 2006; Dockery et al. 2008). The EMTR measures the fraction of incremental increases in an individual's earned income that is lost due to higher tax liabilities and the withdrawal of benefits. Its theoretical justification is sound. The income-leisure choice framework posits that if individuals are free to choose their hours of work each person will keep offering additional hours of labour so long as the value they place on net income gained, comprised of their hourly wage less taxes and any withdrawal of benefits, is greater than the value they place on the hour of leisure foregone.

But workers are rarely presented with a continuous opportunity locus that allows leisure to be traded off against wages 'at the margin'. Moreover, Dockery et al. (2011) empirically tested for the appropriateness of EMTRs as a predictor of transitions into employment and found that this measure has limited relevance to the workforce participation decisions of unwaged individuals. On the other hand, RRs were found to be superior predictors of the decision to take up employment. We therefore concentrate on RRs as our preferred measure of work incentives.

The RRs are computed using a tax-benefit simulator that includes the full range of government tax and transfer programs (see Wood and Ong, 2008, for details). The model is currently operationalized using the 2001-2009 HILDA Survey, and it uses HILDA data records containing the socioeconomic and demographic characteristics of persons, households and income units to estimate their housing and labour market related outcomes under existing policy parameters. The model is thus able to estimate work incentives for survey respondents in the HILDA Survey in each year spanning 2001-2009. Importantly, the model is also able to measure work incentives under alternative policy and economic scenarios. Of especial relevance to this paper are the model's estimates of how employed individuals private incomes, tax liabilities and transfer entitlements would change if they were to transition out of paid work. The model has been used to estimate work incentives in

several studies, including the work incentives of Disability Support Pension recipients (Dalton and Ong, 2007), public housing tenants (Wood et al., 2009), minimum wage workers (Dockery et al., 2010) and unwaged Australians (Dockery et al., 2011).

The RR is defined as:

$$RR_i = \frac{Y_i^u + ISP_i^u}{Y_i^e + Y_i^u + ISP_i^e} \qquad (1)$$

where Y_i^u is unearned disposable private income of individual *i*. This is assumed to be the same regardless of whether the person is in work or out of work. ISP_i^u is income unit income support payments (ISPs) when out of work. Y_i^e and ISP_i^e are after-tax earnings and income unit ISPs when *i* is employed. ISP_i^u and ISP_i^e are computed on an income unit basis; interactions that cause changes in a partner's transfer income are then taken into account.[4] This is potentially important for correct measurement of couples' work incentives. However, it is the individual's unearned disposable private income, not their partner's, which enters the numerator and denominator of the replacement ratio.[5]

Imputations

Calculation of the RR at time *t* needs an estimate of the income the employed individual would be receiving if they were 'inactive'. This estimate must account for the fact that those leaving paid employment may become eligible to receive ISPs. The assessable income of the individual is calculated to determine whether s/he is eligible to receive means-tested ISPs upon quitting employment (the means tests are defined with respect to assessable income). We use reported private unearned income to estimate assessable income when not working. If an employed person is already receiving an ISP during wave *t*, it is reasonable to assume that s/he would continue on the same ISP. If an employed person is not receiving an ISP during wave *t*, we exploit the longitudinal nature of the HILDA Survey and implement a backward-looking approach by assigning to the person the ISP s/he is observed to be receiving in wave *t*+1. If the person is not an ISP recipient in either waves *t* or *t*+1 we assume eligibility for a Disability Support Pension, provided s/he reports a long-term health condition. If no long-term health condition is reported, the person is assigned to the Age Pension program if they exceed the minimum eligibility age. Those with children under certain age limits are assigned to the Parenting Payment program. The rest are assumed to receive Newstart Allowance. Entitlements are computed given our estimate of assessable income.

Econometric model

Calibrating the numerical value of RRs facing Australians is the first step in an analysis of work incentives. From a policy perspective, the critical question is whether or not higher rates of such measures really do influence individuals' behaviour and, if so, the extent to which they discourage labour supply. For the sample of employed persons (described above) drawn

[4] An income unit is defined as one or more individual persons whose command over income is assumed to be shared between the persons comprising the unit (ABS, 1997). Income sharing is assumed to take place within married and de facto couples, and between parents and dependent children. Government benefit entitlements are typically determined by the income unit's (as opposed to personal) assessable income.

[5] While partner's private income is not included in the RR measure, partner's income is entered into transition models as a separate independent variable.

from waves 1-9 of HILDA, employment status at time t+1 is modeled using data from waves 2-10.

A logistic model is estimated with the general form;

$$P(Emp_{i(t+1)}) = f(RR_{it}, X_{it}, Wave_{it}) \qquad (2)$$

where $P(Emp_{i(t+1)})$ is the probability that individual i remains employed in wave t+1, RR_{it} is the RR of individual i in period t, X_{it} is a vector of i's demographic and human capital variables in t and $Wave_{it}$ are dummy variables added as controls for calendar year fixed effects. The vector X_{it} includes variables to capture age, marital status, the presence of children, indigenous status, health, level of education, partner's disposable income (earned and unearned), housing wealth and debt, and superannuation holdings. 82% or 6519 of the 7,968 individuals in the data set contribute at least two person-periods of employment to the data set. It is reasonable to suspect some dependence among these repeated observations, and so we estimate a random effects logit model.

4. Descriptive statistics

Estimates of typical RRs in the Australian working population are presented in Table 1 for each year 2001 to 2009. The mean and median over the entire period are 33% and 29% respectively. They are somewhat higher at the end of the decade, with increases of around 4 percentage points, though the increase is unevenly spread over the period. It seems that despite earnings growth, changes in tax provisions and ISPs have resulted in blunter work incentives for the average Australian worker. On the other hand, trends in WA have been very different. After starting the decade with RRs higher than the Australian-wide average, WA work incentives improved such that they dipped below Australian averages in 2009. In Perth, RRs declined from 29% to 27% and in the balance of WA from 34% to 28%.

Table 1: Summary statistics of RR, by year

Year	Mean (%)	Median (%)	Standard deviation (%)	Count
2001	31.2	26.9	23.4	4255
2002	31.4	27.1	23.4	4191
2003	32.6	28.4	24.3	3982
2004	32.6	29.6	23.9	3869
2005	34.8	31.4	24.5	4210
2006	33.4	30.0	23.7	4048
2007	33.4	29.6	23.9	3892
2008	32.2	28.7	23.3	3869
2009	34.5	30.9	25.1	3846
Total	***32.9***	***29.1***	***24.0***	***36162***

Source: Authors' own calculations from the 2001-2009 HILDA Survey

Table 2 organises the sample into wage deciles defined with respect to the 2001 and 2009 wage distributions. Intermediate years are not reported as there are only small increases or decreases in RRs in each wage decile[6]. Wages are annualized weekly wages, so part-time workers are concentrated in the lower wage deciles. Wage deciles are defined contemporaneously. Work incentives are very blunt in the lowest wage decile, with RRs of roughly 75% in 2001 and 2009. This means that incomes out of work replace as much as three-quarters of incomes when in work. There is then a sharp decline in RRs as we move from the lowest to the second lowest wage decile, and this is followed by a monotonic

[6] The exception is the second lowest decile, where there is a relatively sharp increase from 44% to 55%

decrease through to the highest wage decile. The financial motivation to quit employment is much greater at the lower end of the wage distribution, with RRs in the lowest decile more than five times those in the highest decile.

Table 2: Median RRs by wage deciles, 2001 and 2009

Wage Deciles	2001		2009	
	Wage range ($)[a]	RR (%)	Wage range ($)[a]	RR (%)
Lowest 1	624-13,572	73.8	624-20,228	75.0
2	13,624-21,684	43.6	20,280-30,836	55.3
3	21,736-26,572	41.3	30,888-37,908	43.3
4	26,624-31,200	35.2	37,960-44,200	37.3
5	31,252-35,880	33.1	44,304-52,000	31.6
6	35,932-41,600	28.5	52,104-58,864	28.2
7	41,652-47,892	25.7	59,020-67,600	28.8
8	47,996-54,652	22.6	67,704-79,768	21.3
9	54,704-69,628	20.1	79,976-103,688	19.1
Highest 10	69,680-317,512	12.3	103,740-360,828	13.7

Source: Authors' own calculations from the 2001-2009 HILDA Survey
Note: a. Wage ranges are defined at current prices.

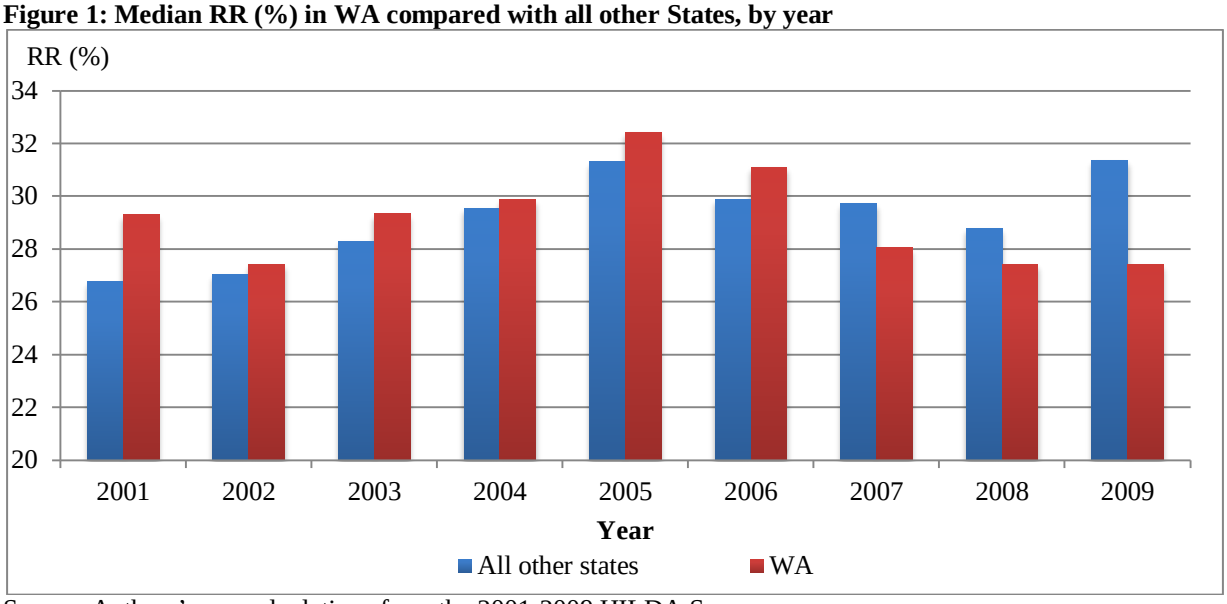
Table 3 explores the geography of work incentive measures. It confirms that a very different picture has developed in Perth and the balance of WA over the decade. They are the only areas in Australia where work incentives have improved. In the balance of WA, RRs have markedly decreased by 6 percentage points. In contrast, Tasmanian RRs shot up by 11 percentage points over the same period. By comparison with the rest of Australia, WA RRs reached levels that were 4 percentage points lower in 2009 (see Figure 1). We suspect that these divergent patterns are largely attributable to differential regional wage growth as Commonwealth tax and benefit parameters are uniformly applied across the nation. Some indication of this can be found in average earnings trends over the sample timeframe; using the HILDA sample designed for this study, average earnings in the balance of WA grew by 56% over 2001-2009, but by only 38% in Tasmania 2001-2009.

Table 3: Median RRs by region, 2001-2009, %

Region	2001	2002	2003	2004	2005	2006	2007	2008	2009	% point change 2001-2009
Sydney	24.1	24.0	24.4	26.1	27.4	26.8	26.4	25.6	27.4	3.3
Balance of NSW	31.4	28.3	31.7	32.9	35.3	35.1	32.7	30.8	33.6	2.2
Melbourne	23.2	24.6	26.2	26.2	28.8	26.2	27.0	27.4	29.4	6.2
Balance of Victoria	30.8	32.0	30.9	32.3	35.7	34.3	35.5	32.6	35.2	4.5
Brisbane	25.5	26.5	28.1	29.0	30.6	30.2	29.1	28.9	31.9	6.5
Balance of QLD	31.3	30.1	30.1	33.1	31.3	32.3	32.7	30.4	32.3	1.0
Adelaide	28.5	30.0	31.9	32.1	33.7	33.8	35.6	31.4	33.2	4.7
Balance of SA	32.7	38.4	33.2	33.1	37.6	38.3	37.6	35.4	39.6	6.9
Perth	28.7	27.0	28.1	29.9	32.3	29.5	26.3	27.2	27.4	-1.2
Balance of WA	33.7	30.2	33.8	28.8	33.0	36.1	33.6	28.8	28.0	-5.8
Tasmania	23.3	27.0	33.8	36.5	39.1	36.8	33.7	34.8	34.4	11.1
Northern Territory	27.1	32.1	24.3	23.1	26.7	19.8	26.0	32.9	29.2	2.0
ACT	18.1	21.7	20.6	24.3	18.8	21.4	19.7	21.2	18.4	0.3
Australia	27.6	28.6	29.0	29.8	31.6	30.8	30.5	29.8	30.8	3.2

Source: Authors' own calculations from the 2001-2009 HILDA Survey

Figure 1: Median RR (%) in WA compared with all other States, by year



Source: Authors' own calculations from the 2001-2009 HILDA Survey

Table 4 describes the personal characteristics of Australian workers in different RR deciles. If we begin by looking at the highest decile, we see that RRs are extremely high at 82% - in other words just over 80 cents in every one dollar of income in work is replaced. The people most likely to be in the eighth, ninth and tenth deciles are sole parents, divorcees, Indigenous, those with long-term disabilities, and persons with no post-school qualifications. These are all groups that typically have relatively low rates of economic participation, as reflected in the finding that workers in the highest decile have spent three-quarters of their time in paid work since leaving full-time education (it is almost 90% among those in the lowest decile, where work incentives are strongest). In the highest RR decile, average earnings are relatively low at roughly one-quarter of those in the lowest decile. However, average unearned private income is high. This is because those aged 55 plus are over-represented in this decile (27% as compared to 15% of the total sample). Indeed, home owners in this high decile group have considerable amounts of housing wealth to fall back on (a mean value of $413,000), and if they are mortgagors their average debt levels are well below those in the total sample. At very high RRs, there appears to at least two contrasting groups. There is the typically disadvantaged – long-term disability, Indigenous, divorced sole parents, low superannuation savings – with low earnings and hence unattractive financial prospects in employment. On the other hand, there is a second group of older Australian workers that have benefited from booming house prices from the late 1990s onwards. It seems likely that this second group will find continued employment less and less financially attractive as they age, and will be unresponsive to government efforts designed to extend working lives beyond conventional retirement ages.

In the lowest three deciles, RRs decline sharply from 14% to only 1% in the bottom decile. So in the bottom decile, only 1 cent in every one dollar of income in work is replaced[7]. This does not appear to be related to age; however household type is relevant. Childless couples make up over 50% of those in the bottom decile as compared to only 26% of the total sample.

[7] There is a caveat; RRs are estimated assuming unearned private income as reported when employed is the same as it would be if transitioning out of employment. But those taking early retirement, for instance, are likely to annuitise superannuation balances. Others might cash in some of their housing equity and invest proceeds in liquid financial assets that yield a return. Underestimation of RRs is therefore likely; we are presently investigating ways of taking these options into account in RR calculations.

These childless couples are typically job-rich and employed partners' mean disposable income is high at over $47,000. Their educational attainment is also typically high with 47% possessing degree qualifications and they have spent a high proportion (89%) of their time in paid work since leaving full-time education. A majority of this group have mortgages and these mortgages are on average nearly $200,000. Thus, those in the lowest RR decile have particularly strong work incentives because they not only suffer dramatic declines in income, but also need to service high levels of debt following transitions out of employment.[8]

[8] On examining workers in Perth and the balance of WA over the decade, we find very similar patterns. Perth and balance of WA estimates are available from the authors upon request.

Table 4: Personal characteristics by RR deciles, Australia, person-period data 2001-2009:

(a) Demographics characteristics and health

		Lowest 1	2	3	4	5	6	7	8	9	**Highest** 10	**All**
Person's mean replacement rate		1.3	7.3	14.3	20.8	26.5	32.1	38.5	46.8	59.2	82.0	32.9
	Age (mean)	42	43	43	42	42	41	42	42	44	46	42.57
Income unit type (column percent)	Couples with children	41.5	54.3	55.0	46.8	40.9	39.6	40.9	45.2	42.1	33.3	44.0
	Couples no children	55.4	40.2	29.2	20.2	15.5	14.7	15.1	18.0	23.6	28.1	26.0
	Sole Parents	0.1	0.7	1.9	2.5	3.2	4.0	4.8	7.1	14.2	18.7	5.7
	Singles	3.0	4.8	14.0	30.5	40.5	41.8	39.2	29.7	20.1	19.8	24.3
Marital status	De facto	20.2	16.1	13.4	10.1	8.5	7.6	8.2	10.5	11.2	8.7	11.4
	Divorced	0.9	1.8	4.1	8.3	10.4	10.8	11.4	10.6	11.8	13.7	8.4
	Legally married	76.8	78.5	71.3	57.7	48.5	47.2	48.6	53.2	54.8	53.1	59.0
	Single never married	1.4	2.6	8.2	19.5	26.3	27.4	24.7	18.2	14.0	15.0	15.7
	Separated	0.6	0.7	2.3	3.6	5.2	5.2	5.4	5.5	5.4	6.5	4.0
	Widowed	0.2	0.4	0.8	0.8	1.2	1.7	1.7	2.0	2.8	3.0	1.4
Indigenous (percent)		0.8	0.8	1.2	1.7	1.6	1.2	1.2	1.2	1.4	2.4	1.3
Long term disability (percent)		7.2	12.0	11.3	10.2	10.6	11.4	15.4	19.0	21.9	27.2	14.6

(b) Labour market history and qualifications

		Lowest 1	2	3	4	5	6	7	8	9	**Highest** 10	**All**
Person's mean replacement rate		1.3	7.3	14.3	20.8	26.5	32.1	38.5	46.8	59.2	82.0	32.9
Educational attainment	Certificate	17.1	20.8	22.3	25.0	25.8	25.8	27.3	29.6	26.4	23.9	24.4
	Diploma	10.4	11.1	11.8	9.6	11.0	11.5	11.8	9.8	10.7	10.7	10.8
	University	46.7	40.3	37.0	36.2	32.2	27.1	23.1	20.5	18.1	16.9	29.8
	Year 12	11.4	10.9	11.6	10.9	12.0	14.1	14.5	13.2	13.0	13.8	12.5
	11 and lower	14.4	17.0	17.2	18.4	19.1	21.5	23.4	26.9	31.8	34.8	22.4
Proportion of time in paid work since leaving full time education (mean %)		89.4	89.1	89.3	89.2	88.6	87.6	87.8	85.6	82.0	75.7	86.4

(c) Income, assets and debt

	Lowest 1	2	3	4	5	6	7	8	9	**Highest** 10	**All**
Person's mean replacement rate	1.3	7.3	14.3	20.8	26.5	32.1	38.5	46.8	59.2	82.0	32.9
Earnings (mean $)	64582.8	64935.5	66245.9	58589.9	52845.9	47518.5	44172.4	39603.8	32500.3	17605.9	48866.4
Personal unearned annual private income (mean $)	224.4	1252.1	1936.6	2155.6	2409.1	2694.4	3684.9	5415.3	8222.3	16069.5	4404.5
Partner' disposable income (mean $, persons with partners only)	47420.7	39697.6	34669.0	31884.2	28727.4	27271.7	23884.8	24651.4	22594.3	24498.3	32003.3
Superannuation wealth (mean $)	213073.5	233657.1	234306.2	187781.1	171776.9	152304.1	160579.1	149423.1	146177.3	120882.6	177011.0
% home owners	81.2	83.2	78.6	73.4	67.0	64.3	63.2	65.2	65.3	61.2	70.3
Primary home value (mean $, owners only)	475178.9	446312.3	449126.7	406046.4	394989.0	375330.8	386565.3	384783.2	392446.7	412952.0	415388.1
% with outstanding home loans	55.9	54.7	54.7	52.0	47.3	45.0	42.5	42.3	38.9	28.1	46.1
Primary home debt (mean $, mortgagors only)	194687.3	177785.9	183673.8	162095.0	153259.6	154846.5	148451.5	143737.6	139810.7	130781.6	162161.9

Source: Authors' own calculations from the 2001-2009 HILDA Survey

5. Modelling results

Because we expect housing wealth to be a potentially important influence logit models are estimated separately for owners and renters. We also draw a distinction between transitions into unemployment and transitions out of the labour force; factors shaping employment transitions are likely to differ between these groups. We present results from four models, based on the following samples:

- Employed **owners** in wave *t* who either remain in employment or transition into **unemployment** in wave *t*+1 (Table 5);
- Employed **renters** in wave *t* who either remain in employment or transition into **unemployment** in wave *t*+1 (Table 5);
- Employed **owners** in wave *t* who either remain in employment or transition **out of the labour force** in wave *t*+1 (Table 6);
- Employed **renters** in wave *t* who either remain in employment or transition **out of the labour force** in wave *t*+1 (Table 6).

After allowing for missing values, there are 5,672 (2,797) owners (renters) who either remained employed or transitioned into unemployment, and 5,884 (2,878) who either remained employed or moved out of the labour force. However, as the samples are pooled across ten years, overall we have robust sample sizes of over 23,000 and 8,200 in the owner and renter groups respectively.

We first consider variables that are the focus of interest in this paper – work incentives, housing wealth and superannuation. Then we consider the other socio-demographic variables. The estimated effect of higher RRs is consistently negative and statistically significant in all four models. They suggest that for every 1 percentage point increase the odds of retaining employment fall by 1-2 percentage points. The replacement rates are a stronger influence in shaping moves out of the labour force than transitions into unemployment. On the other hand, the behavioral responses of owners and renters are uniform.

In the owner equations we fail to detect any significant housing wealth effects from the home value variable. If housing wealth only comes into play when workers approach retirement age the effect could be masked by a sample that contains more people from the early stages of the life cycle (only 15% of owners are over 55 in the sample). We might therefore expect larger impacts on transitions out of the labour force, but the variable is insignificant in that model also.

The superannuation variable is positive and significant in three of the four models. The positive sign indicates that those with higher superannuation wealth are more likely to remain in paid work. This finding is surprising. However, rather than representing a 'wealth' effect, this variable could be capturing the influence of unmeasured factors correlated with labour market history; higher superannuation wealth will reflect longer periods of time spent in paid work since leaving full-time education.

The coefficients on the socio-demographic variables generally have the expected signs, though there are some variations across housing tenure groups, and according to whether the sample design is based on transitions into unemployment, or transitions out of the labour force. Table 5 presents estimates of the probability of remaining employed for a sample that either remained in employment over the entire time frame, or transitioned into unemployment. Unsurprisingly, couples with children are significantly more likely to remain

employed as opposed to becoming unemployed. The impact of this household characteristic is large-the odds of partnered owners with children are lifted to levels 51% higher than those of singles; among renters the odds of staying employed are lifted to levels almost 75% above those of singles. Post-school qualifications also appear to have a protective effect against unemployment, although this is only significant in the case of renters. Indigenous status is significant among renters, with the chances of retaining employment seriously depressed among this group of Australians[9].

Table 6 reports estimates of the probability of remaining employed for owner and renter samples that either remained in employment over the entire time frame, or transitioned out of the labour force. Discouraged workers, the physically and mentally disabled and those choosing to retire will make up the vast majority of flows out of the labour force. We can therefore expect age to be an important factor since ill health is more likely to set in as people age, and retirement decisions are made later in working lives.

There is strong confirmation with older Australian workers and particularly those over 55 more prone to move out of the labour force in comparison to those of prime working age (35-44). The odds of a 55-64 year old owner (renter) staying in work are 64% (77%) lower than those of prime working age. A long-term disability depresses the chances of continuing employment. On the other hand the employment status of couples with children, and especially those with a large mortgage, is once again found to be enduring. For mortgagors every $100,000 increase in mortgage debt raises the odds of remaining in employment by 6 percentage points. One suspects that older workers approaching retirement age are more reluctant to quit and take early retirement when they still have an outstanding mortgage debt to pay off. According to the ABS Survey of Income and Housing Costs the proportion of 50-64 year old owners with mortgages climbed from 28% in 1982 to 48% in 2009. Governments are searching for policies that encourage people to extend their working lives, but these findings suggest that the increasing indebtedness of older workers may achieve this end without government intervention.

There are two other findings of note; a partner's disposable income lowers the chances of continued employment when the alternative is exiting the labour force. Partners belonging to job rich couple relationships are then liable to make early transitions out of the labour force, provided they have no children, or mortgage. Sole parents in rental housing seem likely to be an important part of the discouraged worker group, with their chances of continued employment 43% lower than singles.

[9] There are small numbers of indigenous among the owner sample that probably accounts for the insignificance of that variable in the owner-unemployment transition model.

Table 5: Random effects logit model estimates of the probability of retaining employment in time *t+1* as opposed to becoming unemployed, 2001-2010

Explanatory variables[a]	Owners			Renters		
	Coefficients	Standard errors	Odds Ratio	Coefficients	Standard errors	Odds Ratio
Replacement rate (lagged)	-0.013***	0.003	0.99	-0.02***	0.004	0.99
Age (yrs)						
25-34	-0.04	0.23	0.96	-0.05	0.18	0.95
35-44 (reference category)	-	-	-	-	-	-
45-54	-0.12	0.19	0.89	-0.01	0.22	0.99
55-64	-0.11	0.270	0.90	0.61	0.43	1.85
> 64	0.43	0.61	1.53	0.69	1.08	1.99
Persons with long term disability	-0.22	0.19	0.80	-0.01	0.20	0.99
Indigenous	-0.59	0.72	0.56	-1.34***	0.32	0.26
Family status						
Married, no kids	0.15	0.22	1.16	-0.01	0.30	0.99
Married with kids	0.42**	0.21	1.52	0.56**	0.27	1.74
& youngest < 4 years	0.89	0.74	2.43	0.12	0.67	1.12
Sole parent	0.05	0.35	1.05	-0.08	0.23	0.92
& youngest < 4 years	-0.91	0.75	0.40	-0.14	0.67	0.87
Single, no kids (reference category)	-		-	-	-	-
Partner's disposable income ($'0,000)	-0.01	0.03	0.99	0.01	0.06	1.001
Highest education level						
Certificate	0.04	0.22	1.04	0.53**	0.21	1.70
Diploma	-0.24	0.27	0.80	0.60**	0.30	1.82
University	0.16	0.23	1.17	0.70***	0.24	2.007
Year 12	0.12	0.29	1.13	0.59**	0.26	1.81
Year 11 and lower (reference category)	-	-	-	-		-
Primary home value ($'00,000)	0.03	0.04	1.03	-	-	-
Mortgage debt ($'00,000)	-0.01	0.06	.99	-	-	-
Superannuation wealth ($'00,000)	0.06**	0.03	1.06	0.18**	0.08	1.002
Constant	5.89***	0.51		3.45***	0.40	
Observations	23,739			8,221		
Groups	5,672			2,797		
Wald Chi2	69.09***			105.12***		
Log-Likelihood	-1295.70			-906.98		
Lsigma2u	1.014			-.330		
Sigma_u	1.66			.848		
rho	.46			.179		
Likelihood-ratio test of rho=0	32.79***			3.00**		

Source: Authors' own calculations from the 2001-2010 HILDA Survey

*** p<0.01, ** p<0.05, * p<0.1

Note: a. Models also include annual wave indicator variables and controls for Major Statistical Regions (variables to denote State capitals and Balance of State). Complete coefficient results are available from the authors upon request.

Table 6: Random effects logit model estimates of the probability of retaining employment in time *t+1* as opposed to moving out of the labour force, 2001-2010

Explanatory variables[a]	Owners			Renters		
	Coefficients	Standard errors	Odds Ratio	Coefficients	Standard errors	Odds Ratio
Replacement rate (lagged)	-0.02***	0.001	0.98	-0.03***	0.003	0.98
Age (yrs)						
25-34	-0.58***	0.11	0.56	-0.64***	0.16	0.53
35-44 (reference category)	-	-	-	-		-
45-54	-0.09	0.11	0.91	-0.41**	0.19	0.66
55-64	-1.03***	0.13	0.36	-1.49***	0.24	0.23
> 64	-2.13***	0.19	0.12	-2.87***	0.42	0.06
Persons with long term disability	-0.50***	0.08	0.61	-0.48***	0.14	0.62
Indigenous	0.29	0.43	1.34	-0.51	0.33	0.60
Family status						
Married, no kids	-0.47***	0.10	0.62	-0.30	0.20	0.74
Married with kids	0.34***	0.11	1.40	0.16	0.19	1.17
& youngest < 4 years	-0.73***	0.22	0.48	-0.02	0.43	0.98
Sole parent	0.34	0.22	1.41	-0.56***	0.19	0.57
& youngest < 4 years	0.17	0.22	1.18	-0.31	0.43	0.74
Single, no kids (reference category)	-		-	-	-	-
Partner's disposable income ($'0,000)	-0.08***	0.01	0.92	-0.23***	0.03	0.98
Highest education level						
Certificate	0.33***	0.11	1.39	0.40**	0.17	1.49
Diploma	-0.02	0.13	0.98	0.61**	0.25	1.85
University	0.05	0.11	1.05	0.49***	0.19	1.64
Year 12	-0.04	0.13	0.97	0.34*	0.19	1.41
Year 11 and lower (reference category)	-	-	-	-	-	-
Primary home value ($'00,000)	0.02	0.01	1.02	-	-	-
Mortgage debt ($'00,000)	0.06**	0.03	1.06	-	-	-
Superannuation wealth ($'00,000)	0.01	0.01	1.01	0.071*	0.04	1.001
Constant	4.63***	0.22		5.56***	0.35	258.74
Observations	24,703			8,432		
Groups	5,884			2,878		
Wald Chi2	687.40***			260.96***		
Log-Likelihood	-4306.51			-1472.13		
Lsigma2u	.041			.07		
Sigma_u	1.021			1.04		
rho	.241			.25		
Likelihood-ratio test of rho=0	57.12***			14.44***		

Source: Authors' own calculations from the 2001-2010 HILDA Survey

*** p<0.01, ** p<0.05, * p<0.1

Note: a. Models also include annual wave indicator variables and controls for Major Statistical Regions (variables to denote State capitals and Balance of State). Complete coefficient results are available from the authors upon request.

6. Conclusion

Lifting workforce participation rates is a key objective of policy-makers, given the fiscal pressures created by population ageing. However, the potential work disincentive effects inherent in Australia's tax-benefit system pose an ongoing dilemma for policy-makers striving to increase employment rates and extend working lives.

In this paper we have presented work disincentive estimates, in the form of RRs, of how Australians' financial circumstances would change as a result of transitioning from employment into unemployment or economic inactivity. We profiled changes in work

incentive measures over the first decade of the new millennium and found that mean and median RRs have increased by around 4 percentage points over the period 2001-2009. Thus, it would appear that earnings growth and changes in tax provisions and ISPs have resulted in blunter work incentives for the average Australian worker. However, a geographical analysis highlights trends in WA as being distinctly different from the rest of Australia. After starting the decade with RRs higher than the Australian-wide average, WA work incentives improved over the period 2001-2009. In Perth, median RRs declined from 29% to 27% and in the balance of WA from 34% to 28%. There are then growing geographical disparities in work incentives. Consider Tasmania and balance of South Australia, for example; over the same 2001-2009 timeframe median RRs climbed from 23% to 34%, and in balance of South Australia from 33% to 40%. The geographical trends in RRs suggest that Western Australia has relatively sharp work incentives that should help sustain superior employment participation rates.

Employed persons with high RRs, and therefore blunt work incentives, appear to fall into two polarized groups. Sole parents, divorcees, Indigenous, those with long-term disabilities and persons with no post-school qualifications tend to have high RRs. These groups have low earnings and hence unattractive financial prospects in employment. On the other hand, older Australian workers who have benefited from booming house prices from the late 1990s onwards and the superannuation guarantee also have high RRs. They will find continued employment less and less financially attractive as they age given comfortable reserves of housing and pension wealth to fall back on should they choose to retire.

Australian workers with strong employment incentives include job-rich couples. It is worth noting that most have mortgages that average nearly $200,000. Thus, they would not only suffer dramatic declines in income, but they might also need to service high levels of debt following transitions out of employment.

Our modelling results confirm that work incentives have a significant effect on the likelihood of remaining employed. Indeed, every 1 percentage point increase in the RR lowers the odds of retaining employment by 1-2 percentage points relative to the odds of either transitioning into unemployment, or out of the labour force. This is the case for both home owners and renters, so the differing asset position of these household groups does not affect their responses to work incentives.

There are some important implications for ageing and employment participation. There are sharp declines in the chances of continued employment in age ranges beyond prime working age (35-44). But there are some interesting caveats. Home owners with mortgages are more prone to extend working lives, and indebtedness has soared in the pre-retirement stage of the life cycle. Partners in job rich relationships are inclined to leave the workforce early, but they are a shrinking demographic as singles grow in number. These trends might promote extended working lives among a growing number of senior Australians, but firm conclusions here are contingent on a better understanding of the influence that housing and superannuation has on employment participation.

This analysis has uncovered a number of issues that are worthy of further investigation through future analysis. First, the modelling reported in this study did not uncover any housing wealth effects. Future research might focus on those nearing retirement age to detect whether housing wealth plays a greater role in influencing the retirement decisions of those who have passed the peak of life cycle earnings. Furthermore, refinement of the model could

allow more robust measurement of superannuation (and housing) wealth's impact on employment participation in a more effective manner. This can be achieved by entering labour market history variables into the modelling specification to disentangle labour market history effects from 'wealth' effects.

Finally, there are two methodological innovations that are worthy of consideration. This is a panel data set and more efficient exploitation of the longitudinal characteristics of the data would be achieved by fixed effects modeling within a hazard modeling approach. Secondly, while this paper has modeled transitions into unemployment and economic inactivity separately, an intended future research strategy is to model these transitions simultaneously through the use of multinomial modelling approaches.

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CONTACT

Bankwest Curtin Economics Centre
Curtin University
Kent Street Bentley WA 6102
GPO Box U1987 Perth WA 6845

Tel: +61 8 9266 2873

bankwesteconomicscentre@curtin.edu.au
business.curtin.edu.au/bcec